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LIVELIHOOD TRANSITIONS IN THE RURAL
MEDITERRANEAN AS CATALYSTS FOR FOREST FIRES:
A CASE STUDY OF KFARMATTA, LEBANON

by
LEILA SOUHEIL EL ZEENNI

A thesis
submitted in partial fulfillment of the requirements
for the degree of Master of Science
to the Department of Landscape Design and Ecosystem Management
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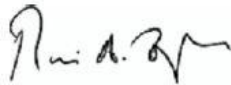
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ABSTRACT OF THE THESIS OF

Leila Souheil El Zeenni

for

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Title: Livelihood Transitions in the Rural Mediterranean as Catalysts for Forest Fires: A Case Study of Kfarmatta, Lebanon

Forest fires are becoming a serious threat in the Mediterranean region and drier bioclimatic conditions are the first thing that comes into one's mind when thinking about the causes. This research seeks to explore how recent changes in livelihoods affect the occurrence of Mediterranean forest fires. Using Kfarmatta, Lebanon, as a case study village, the study hypothesis is that changing bioclimatic conditions are not the only reasons behind the occurrence of forest fires, instead socio-economic transitions and environmental transformations act as catalysts for forest fires. The first part of the methodology was an in-depth interview conducted with nine forest stakeholders recruited from Kfarmatta in order to understand livelihood pattern changes in the village. The second part of the methodology consisted of a participatory mapping exercise of ecosystem services' social values. As a result, it was observed that intangible socio-economic changes implying a "livelihood shift" are happening in Kfarmatta. The intangible social dimension is seen through a weaker forest culture and the loss of traditional forest uses, while the intangible economic dimension is seen through the process of deagrarianization that leads to livelihood diversification. These intangible socio-economic changes in rural areas lead to future tangible environmental changes such as the increase in biomass undergrowth fuel and an increased forest continuity which makes these landscapes more vulnerable to forest fires. Therefore, the study concludes that the socio-economic factors should be dealt with in order to reduce this vulnerability, which can be done through working with the concept of "community forestry" and positively working with the process of "new ruralities".

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CHAPTER I

INTRODUCTION

A. Shift in Rural Livelihoods and Its Impact on Natural Resources

In the past, rural livelihoods essentially depended on nature; people had their traditional ways of managing natural resources in and around villages to meet their needs. However, in the last 50 years, rural livelihoods have evolved and people became more detached from their immediate environment and less concerned with the management of the natural resources it harbors. This evolution of rural livelihoods which has occurred in many countries may be due to the "intertwining of urban and rural culture, the modern and traditional, the global and local" (Petkovic, 2007). Many examples illustrate the change in rural livelihood; for example, modernization in Ghana affected the cultural values, socio-economic conditions, and family communication of rural communities (Mensah & Amissah, 2016). In the US, agricultural stewardship, which formed the essence of a farmer's job, sustained natural resources, and maintained a social network within the community, was lost with the advent of 'modern' agriculture (Pyrkosz, 2008). In Laos, increased market pressure and intensification of agricultural practices caused a shift from upland agriculture to cash-crop oriented systems (Thongmanivong & Fujita, 2006). In India rice diversity decreased from 30 000 varieties to only 50 (Ehrenfeld, 2003). In Haiti, enrollment in rural schools dropped by 30% and decrease in soil and agriculture productivity was noted (Ehrenfeld, 2003). In Taiwan, forests were cleared and waterways polluted by industrial and agricultural chemicals (Ehrenfeld, 2003). Rural livelihood changes were also documented in the Chinese village of Dong Mei and the Vietnamese village of Phu Gia. These villages

underwent change resulting from new investments that caused residents to sell off rights to their household plots, and the resulting diversification of livelihoods affected the social relations in the village (Leaf, 2002). Change in livelihoods is also documented in Sub-Saharan Africa, where according to Bryceson (2002), all the countries in this region are undergoing "deagrarianization" which is defined as the "long-term process of occupational adjustment, income earning reorientation, social identification and spatial relocation of rural dwellers away from strictly agricultural-based modes of livelihood". In fact, around 40% of African rural household income is derived from non-farm sources.

B. Mediterranean Landscapes and Forest Fires

Mediterranean rural livelihood was based on the coexistence of residents with their natural surroundings. The traditional Mediterranean rural landscape was according to Makhzoumi et al. (2012) a "rich and diverse mosaic of woodland patches, degraded maquis shrubland, terraced perennial cropping of olive trees and vineyards." The rural landscape was a typical combination of 'natural' and 'cultural' ecosystems. It combined agricultural, silvicultural and pastoral uses within an integrated management system, and its uses were multifunctional, its environment was sustainable, and its culture was valued (Makhzoumi et al., 2012). Mediterranean forests provided many services including wood and non-wood forest products (like cork, medicinal and aromatic plants such as thyme and rosemary, berries, carob, pine nuts, mushrooms and honey), hunting and other recreational activities. In addition, managed Mediterranean forests protected soils and water, prevented erosion, and supported biodiversity (Food and Agriculture Organization (FAO)).

Like elsewhere, however, the shift in rural livelihood, which was primarily due to a rural-urban migration leaving an aging rural population (or rural depopulation), led to the abandonment of natural resources in countries around the Mediterranean basin. As a result of years of abandonment, agricultural and natural landscapes turned into dense forests - through a forest re-growth phenomenon (Gellrich et al. 2006) - susceptible to forest fires that are expanding in scale as a result of the changing climate and increasing temperatures (Turco et al., 2018; IFI AUB, 2019; Mouillot et al. 2005). According to the FAO, there were 250 000 wildfires in the Mediterranean region between 2006 and 2010.

In Lebanon, rural-urban migration led to abandonment of agricultural and natural landscapes as reported in a 2002 GIS study which showed a reduction in agricultural areas ranging between 30 % in the case of olive and citrus, to more than 70% in the case of fruit trees and vineyards (Masri et al., 2002). The same study concludes that the driving forces that caused these changes are not only due to the community itself, e.g. population stress on land, or increasing demand for water, but also to the policies and regulations which control land use. According to Tabara et al. (2003), reasons for new forest fire risk situations should be based on recent and specific social and environmental conditions in the local rural landscape.

This research seeks to explore how recent changes in livelihoods affect the occurrence of Mediterranean forest fires. Using a case study in the Eastern Mediterranean country, Lebanon, the study hypothesis is that changing bioclimatic conditions are not the only reasons behind the occurrence of forest fires, instead socio-economic transitions and environmental transformations act as catalysts for forest fires.

Forests in Lebanon are mostly found in the Mount Lebanon Range; with a cover of about 137,000 ha while the Other Wooded Lands cover 106,000 ha of the territory, both of which form 23% of the Lebanese lands. About 57% of the forests consist of broadleaved species (primarily oaks), and 32% of the cover consist of coniferous species (mainly pines). The remaining forested areas consist of mixed broadleaved and coniferous forests. The ownership of the forested lands is equal between the private (and religious) sector and the public (state, municipal and communal) sector (Ministry of the Environment (MOE), 2011). According to the National Forest Assessment Program, fires represent the second-highest factor causing forest tree damage after climatic conditions such as winds, snow, and lightning. Forest fires mainly affect the following forest species: *Pinus halepensis* and *Pinus brutia* followed by *Quercus coccifera* and *Pinus pinea*, then *Cupressus sempervirens*, with a high probability of natural regeneration for the *Quercus* spp. and *Pinus brutia*, and a low probability of natural regeneration for the *Pinus pinea* due to the overexploitation of its seeds (MOE, 2014). The incidence of forest fires between 2004 and 2009 is on the increase in terms of fire events (from 129 to 280), and total burnt forested area per year (from 586 to 2,642 ha) (MOE, 2011).

CHAPTER II

METHODOLOGY

A. Study Area

The research focused on the village of Kfarmatta located in an area where fire risk is considered high to very high, and which was affected by the forest fires of 2019 (Figure 1).

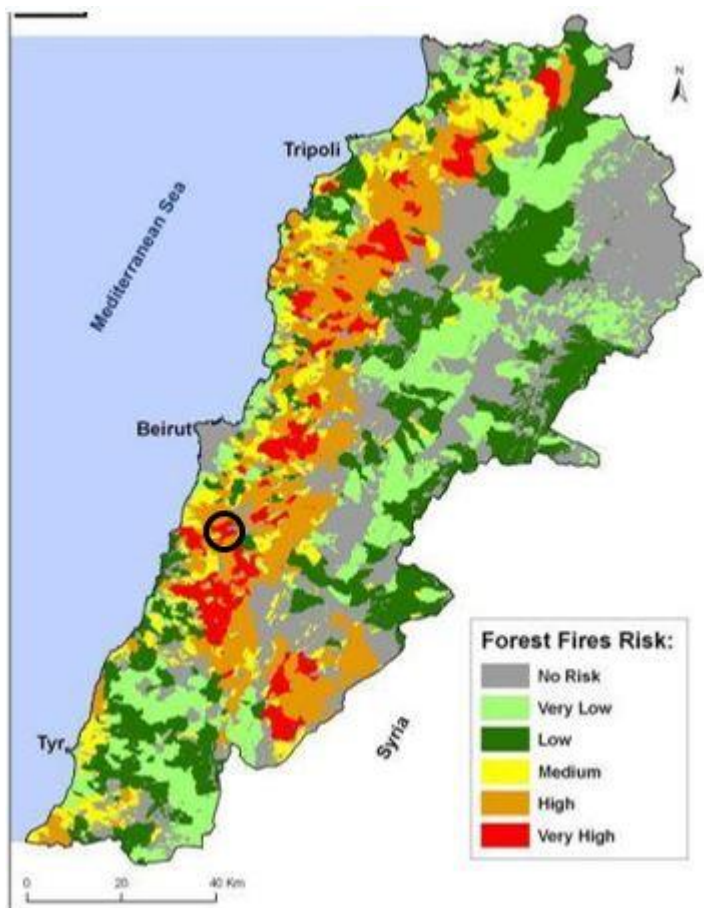


Figure 1 Forest fire risk of Lebanon (source: AFCD, 2007). The study location, the village of Kfarmatta, is located within the area circled in black.

Kfarmatta is a rural village located at 700 m above sea level with a population estimated at 5000. The village includes two religious communities that went into

conflict during the Lebanese Civil War of 1974, but have reunited starting 2005 after a reconciliation between the representative political parties occurred.

The village, which covers an area of 11.64 km², is located in a vegetation zone typically described as Mediterranean, consisting of evergreen trees such as Pines, Cypress, and Oaks, as well as fruit trees such as Olives, Walnuts, and Grapes (Figure 2). The evergreen forests consist of 50% of the total area and the olive plantations consist of 30% of the total area. A branch of the Damour River, which starts in the Barouk Mountains and ends in the Mediterranean Sea, passes by the Southern borders of Kfarmatta. The village also has an interesting geological feature, the Fizr, which consists of two large rocks separated by a fissure (Figure 2).



Figure 2 Overview of the case study site. a) Village of Kfarmatta (source: author), b) The Fizr geological feature (source: discoverlebanon.com), c) Olive orchards (source: author)

Some of the houses in Kfarmatta date back to the beginning of the thirteenth century, while the western neighborhood, known as “Bsheelqab”, pre-dates the actual village and this neighborhood contains the famous historical Ain-Bsheelqab spring (Figure 3). Nearby there are remnants of a historical silkmill built in 1860, and a flour mill.



Figure 3 a) Bsheelqab historical spring (source: author), b) Traditional silkmill (source: <https://www.cityofaley.com/villages/kfarmatta/>), c) Historical flour mill (source: author)

Recent local changes include the building of more than thirty summer rental private residences with swimming pools in the midst of the olive grove area, and the twinning initiative since 1988 between Kfarmatta and the village of Martignano in Italy to promote ecotourism (Figure 4).

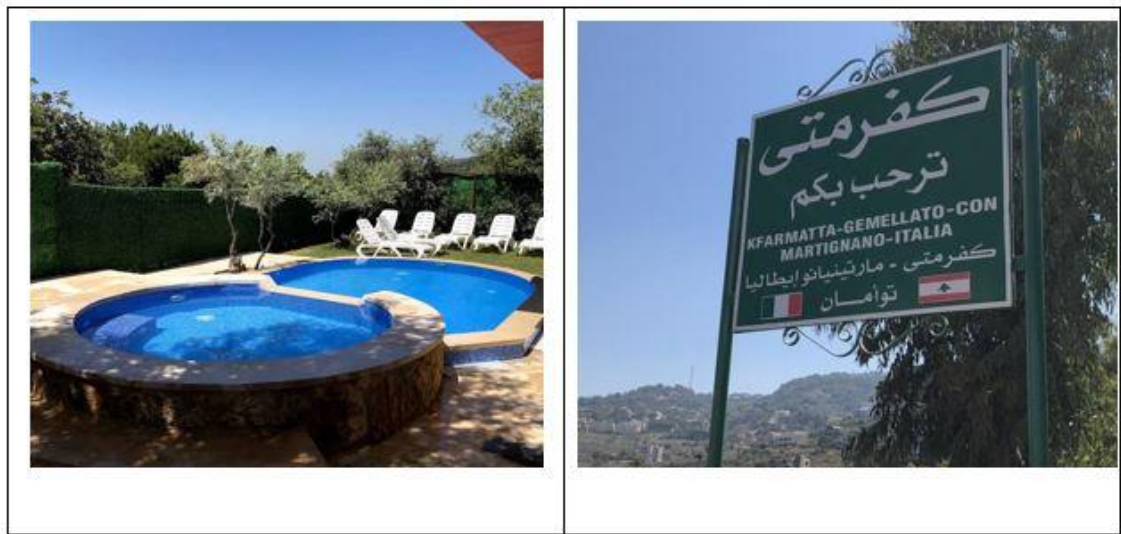


Figure 4 a) Private pools within the olive orchards (source: <https://aura-resort.business.site/>), b) Kfarmatta twinning initiative with the village of Martignano, Italy.

B. Method

1. Stakeholder Analysis, Participant Recruitment and Ethical Approval

Primary and secondary forest stakeholders were recruited after conducting a stakeholder analysis following the method of Amborse-Oji et al. taken from the *Forestry Commission Journal* (Figure 5).



Figure 5 Stakeholders in the forest mind map (source: Ambrose-Oji et al., 2011)

The outcome of the mind map was a list consisting of people, from different genders and age groups ranging between 20 and 70 (Table 1).

<u>Category/Position</u>	<u>Gender</u>	<u>Age</u>
Forest neighbor	M	20
Forest landowner	F	40
Forest user	F	20
Other businesses: olive farmer	M	70
Other businesses: private pool owner	M	50
Forestry related businesses:	M	60

charcoal producer		
Local NGO member	F	30
Public agencies: mokhtar	M	60
Other businesses: professor	F	50

Table 1 The list of participants recruited from the village (source: author)

The research design was reviewed and determined “exempt” by the American University of Beirut Institutional Review Board due to its low risk to participants.

2. In-Depth Interviews

In depth interviews were conducted with primary and secondary forest stakeholder residents to develop an understanding of livelihood pattern changes (Appendix). The questions focused on the village’s natural resources, perceived past and current status of these resources, and their future prospects. More specifically, the question guide aimed to shed light on natural resource management and perceived ecosystem services and looks at the interconnection of environmental-ecological, social-cultural, and economic dimensions, with an additional emphasis on policies and regulations that are controlling land use. The interviews lasted around thirty minutes to an hour each, and were recorded with permission from the interviewees.

The interview data was analyzed qualitatively, using thematic analysis, following several steps. First, the voice recordings were listened to for the first time to get familiar with the data. Then, the data was transcribed verbatim for each interview. After reading the transcribed data several times, important and relevant quotations were

highlighted, and analytical memos were developed for each interview, based on the highlights. Codes were generated and these were then grouped into thematic categories.

3. Participatory Mapping

A participatory mapping exercise, similar to participatory GIS techniques developed by Marketta Kytta (2011) was conducted at the end of the in depth interview to understand how the participants perceived ecosystem services (provisioning services, regulating services, cultural services and supporting services) provided by the village natural resources, or according to Sherrouse et al. (2011), to shed light on what is known as the “social values” of ecosystem services. Many studies worked on analyzing the social values perceived in the forest (Riper et al. (2012), Fagerholm & Käyhkö (2009), and Moore et al. (2017)). The list of social values used in this research is taken from Beverly et al (2008), and includes the aesthetic, biological diversity, economic, educational, existence, cultural, recreational, spiritual, subsistence and wilderness values. Each participant was given colored stickers to represent the different attributes and was asked to pinpoint locations on a GIS aerial map of Kfarmatta (Figure 5).



Figure 6 Colored stickers placed by an interviewee on the aerial map of Kfarmatta (source: author)

CHAPTER III

RESULTS

A. General Village Map Analysis

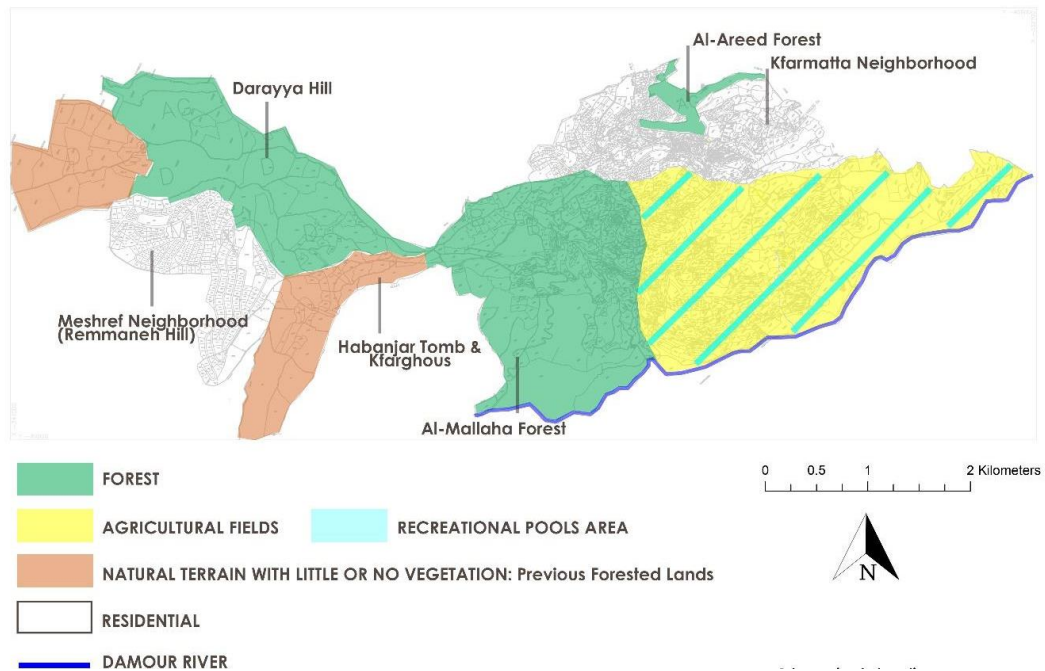


Figure 7 Kfarmatta general village map analysis (source: author)

Half of Kfarmatta’s village lands consist of semi-natural areas including two pine and oak forests, Al-Areed Forest and Al-Mallaha Forest with the Darayya Hill being an important part forming this forest (Figure 6). Al-Mallaha forest occurs on private lands that are being developed for tourism. Al-Areed is a communal forest on “Mashaa” and the local intent is to transform it into a conserved area (or “Hima”) with joint efforts from the municipality and national NGOs. One respondent that works closely with both the municipality and the NGOs, explained that in 2018 tree pruning was performed and fire break passages were constructed by a national NGO in collaboration with the municipality to help protect the forest from fires. The same

respondent indicated that there are ongoing efforts to train the village youth in fire prevention and control as well as safety measures during forest fire fighting. In addition, there are plans to monitor and benefit from the fire risk index maps to inform people beforehand that a fire might happen. The map also points to degraded terrain which used to consist of forests; according to local accounts these lands are now bare due to forest degradation caused by the consecutive forest fires. Concerning the agricultural lands which form 30% of the total village's area, they mainly consist of olive trees, with the second and third eldest olive trees in Lebanon being found within these fields. More than thirty recreational pools for rent are also located between the olive groves, an industry that became very popular during the last five years. Kfarmatta has two residential neighborhoods, the main traditional Kfarmatta neighborhood located to the east, and the Meshref Project neighborhood located to the west, which consists of high-class privately owned villas.

B. Perceptions of the Natural Resources of Kfarmatta

Three themes emerged from the thematic analysis of the in-depth interview transcripts. The first theme: *"Agriculture: from dependency to detachment"* focuses on the relationship of local villagers with agriculture. The second theme: *"The forest: essential but endangered"* focuses on how villagers see that the forests are becoming a threatened resource while still being perceived as important. The last theme *"Recent forest fires: skepticism and emotional impact"* focuses on the forest fires of 2019 and the skepticism around the causes of the fire.

1. Agriculture: From Dependency to Detachment

Residents relayed livelihood changes indicating that in the past, they used to depend on agriculture for a living, however, this relationship slowly degraded, and there is a recent shift away from agriculture and towards tourism, as evidenced by the rise of the private pools industry that is more remunerating than agriculture.

According to all the stakeholders, there used to be a big dependency on the outcome of olive production in the years preceding the civil war. One stakeholder describes the relationship as follows:

“I still remember my grandfather, how his relationship with the land was very strong and spiritual. I remember how he used to deal with the land; he felt that he was part of it”.

Another interviewee mentioned that in the past, there was “affection” towards the land, and that it was “their life, their resources, people depended on it to survive”. He explained that this relationship with the land has decreased due to technology and the shift towards the city. Another interviewee described the relation with the land after the Covid19 pandemic as temporarily improved: “Before the pandemic, we used to focus more on our jobs and our life, not nature and the land, but now nature and the land are our getaway. However, I do believe that after the pandemic, people will forget about them once again” He also indicated that nature is not important for the new generation “...because when we look at this very new generation, nature means nothing to them. People in their 20s are the last generation that knows the meaning and the importance of nature.”

With respect to the reasons for the transition in livelihood from agriculture to tourism one interviewee mentioned:

“The owner of a private pool earns in 1 year what his olives would have earned him for a period of 10 to 20 years. One goes with what is more suitable to him”

He explained that the idea was very new and strange, especially for the elderly that were completely dependent on agriculture:

“People thought I was crazy for wanting this shift. Especially the elderly, they were shocked because I was removing olive trees and forest trees to build something for tourism. They used to tell me that my grandfather and my father would be mad at me [...] but if someone is an agricultural farmer now, he will die of hunger. If someone is a cattle farmer now, he will die of hunger. These things do not guarantee you a decent life anymore.”

This shift is increasing to the point where according to one interviewee, a traditional farmer once sarcastically said:

“When we want to visit our agricultural land we must now wear a suit and a tie!”

2. The Forest: Essential but Endangered

The village’s forests are becoming a threatened resource due to the residential spread, and the transformation of some forested plots into sand factories during the civil war. However, the forest is still considered as an important resource to locals as it provides them with many benefits including cultural and provisioning services. Some interviewees believed that nature would always be stronger than humans, due to its ability to regenerate itself. In addition, the forest, according to the participants, provided a neutral space or a context of unity for both communities living in the village.

According to all the stakeholders interviewed, the forests of Kfarmatta are as important as its houses:

“The forests are the essence of Life, they are the oxygen”, “If you want to know the meaning of Life, you have to live and experience nature. You have to visit nature, look at nature, and observe nature. Forests are the Lung of the world.”

Local villagers saw the forest as a beloved neighbor:

“Look, the forest is our life, we live in a forest. Look where we are sitting now, we are surrounded by a forest. I cannot live in the city, I got used to living within the woods, this is our life, and this is how we got raised.”

“When I personally see a mountain full of trees I start praying for it to be safe and to last. This is how much I love trees. I love nature, I love preserving the virginity of nature”.

And as one returning stakeholder mentioned: “The first thing I did when I came back to the village [after the reconciliation] was to make sure the forests were still there. I searched for Al-Areed forest and I found it, I said Thank God! Then I looked for Al-Mallaha forest and was relieved it was still there.”

Forests are also an important resource for villagers as it also offers them provisioning services: “We use it for everything, we pick vegetables such as asparagus”, “As a family, we use the forest for recreational purposes, for peace of mind, and to get edible herbs such as Thyme and Sage. We still do this nowadays of course because we use such herbs. We do not remove them from the roots; we cut them from the stems so they grow back the next season.”

However, as explained by one respondent, the relationship between local residents and the forest appears to be deteriorating with every generation, “Our grandparents lived the forest spirit more. They cannot live in the city, they need to come and sit in the forest every once in a while.”

The residents also noted the threats and destruction that face the forests. “When we left our forested lands for thirty years, they got destroyed. Trees were cut and sand factories were built.” One elderly interviewee relayed the extent of forest loss: “I remember that the Habanjar area [a previous forested zone] used to be all forested. And now as you can see on the map, it is bare land. This is caused by the consecutive forest fires that have occurred, and the big fires of 2019. [...] I remember when I was 15, we used to walk to this forest that has now disappeared. We used to walk from the middle of Kfarmatta to Darayya Hill [a hill in Al-Mallaha forest] under the trees; we could not see the sun”.

On the other hand, some interviewees believed that forests would never disappear as “there is a secret on this Earth. A big earthquake will come and destroy everything humans made but nature will stay and regenerate itself.”

Finally, the participants pointed out that nature brings together the two religious communities of the village through the work done by local NGOs which binds them together to work for the sake of the village, and to help the municipality conserve nature. “The forests, the beauty of nature, is what brings us together, it gives us a very strong tie that bridges the gaps the war created. Us in the local NGO, we work all together from different political backgrounds but with one vision and one goal: to make Kfarmatta a better village for everyone”.

3. Recent Forest Fires: Skepticism and Emotional Impact

The residents thought that the government is to blame for the 2019 forest fire, for not being stricter, however some mentioned that people should start from themselves regardless of the rules of the government. Finally, all villagers stressed on

the emotional impact of forest fires, as these fires do not affect their daily lives but they mostly affect them mentally.

While some stakeholders mentioned global warming and littering as direct causes of fire, all of the interviewees agreed that the fires, especially those of 2019 are Arson fires for personal profits:

“But is it destiny? I don’t think so. It is mainly abandonment and the lack of care from the forest owners, it can also be arson. I was standing on the balcony when the fires happened in 2019, and I saw the forest catch fire in places not reachable by humans or by car. We have no idea how it was catching fire! There is something skeptical about this. There was no wind; the fire ate the whole mountain in a second.”

One interviewee pointed to the absence of planning and management leading to forest fires:

“I believe that the responsibility of taking care of the forest starts from individuals. If you don’t start from yourself you cannot blame the government. Our government does not care about the environment and the forests so you have to start from yourself.”

However, the majority of stakeholders agreed that the government along with the municipality should be in charge of managing the forests to reduce the risk of fires, as mentioned by one young stakeholder:

“In my opinion, if we look at developed countries, it all starts from the top, the government, which puts rules. Then it trickles down to the municipalities and the individuals. The government cannot expect normal people to abide by the rules if there are no rules in the first place. It all starts with proper rules from the government, then it can become a lifestyle to normal people, and people will get used to it.”

On the other hand, the impact of fires is mainly emotional as described by one of the interviewees: “concerning our lives after the fires, it is mainly sadness because the scenery is ruined.”, and another: “Look, when there is a fire in your village you feel that you are burning with the trees, you feel pain, something that is killing you from the inside. There is pain, you can cry because you are losing a part of you. [...] However life goes on and you must continue.”

The fires are therefore mainly affecting local villagers emotionally: “No, the fires do not affect our daily lives. You have to move on. But people who planted the trees might get affected more. But the new generation might not be as affected as the older generation that planted those trees.”

However, there are farmers who lost their agricultural lands during the fires of 2019. These may have a different reaction: “Concerning our lives after the fires, it is mainly sadness because the scenery is ruined. But there are people who lost their lands in 2019 due to the fires and the soil erosion. Some people had no idea where to find their lands anymore. These people have been affected more since their resources have disappeared.”

C. Participatory Mapping of Ecosystem Services’ Social Values

Results of the participatory mapping exercise were integrated in a matrix which shows nine landmarks and areas that were repeatedly selected by interviewees to refer to the ecosystem services’ social values (Table 2, Figure 7).

VALUE/AREA or LANDMARK	Al-Mallaha Forest	Al-Areed Forest	Olive Plantations and Private Pools	Prophet Ayoub Olive Tree	Al-Fizr Phenomenon and River	Bsheeqab Spring and Silkmill	Sit Sara Spring	Historical Flour Mill	Habanjar Tomb
Recreational	3	2	3		6				2
Subsistence	2	3	6		4				1
Cultural						7		2	5
Existence	2	2	2		6	1			1
Aesthetic		4			7				
Biological Diversity	1	1	5		5				
Wilderness		1	1		7				2
Economic		1	9						
Spiritual				1			3		1
Learning		2			1				1

Table 2 Matrix showing results of participatory mapping of the social values of Kfarmatta village as perceived by interviewees (source: author)

Al-Mallaha and Al-Areed forests covered all the social values except for the cultural and spiritual values. Instead, what was chosen for the cultural value were the Bsheelqab spring and silkmill, the Habanjar Tomb landmark and the historical flour mill. For the spiritual value, the Prophet Ayoub olive tree along with the Sit Sara spring and the Habanjar Tomb landmark were repeatedly selected instead. It is also worth noting that the forests were very rarely selected for their economic value, and what was chosen instead were the olive plantations and private pools area.

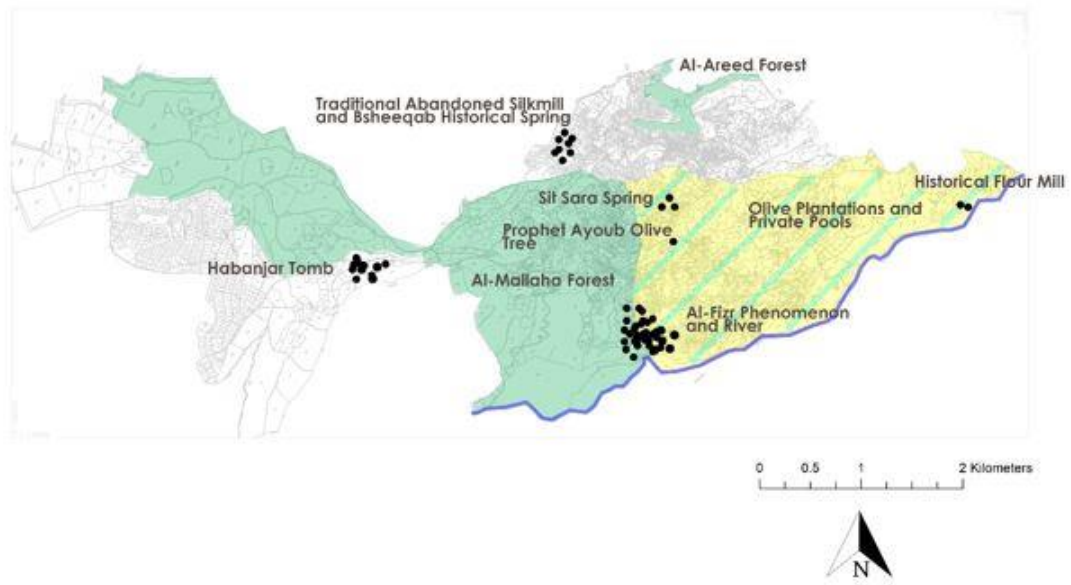


Figure 8 Participatory mapping in Kfarmatta of areas and landmarks with combined social values according to all participants (source: author)

CHAPTER IV

DISCUSSION

In this research, it is argued that intangible socio-economic processes such as a weaker forest culture and deagrarianization happening in rural areas are leading to tangible environmental changes in the rural landscape, which in turn, are increasing the chances of forest fires.

According to Kfarmatta interviewees, there is loss of traditional forest uses such as grazing and the exploitation of forest resources, and this is reflected by the fact that interviewees did not choose forests when considering the cultural value of the village assets nor did they chose them when considering the economic assets of the village. Tabara et al (2003) mentions that a loss of traditional forest culture and forest practices such as grazing is happening in rural areas. One of the reasons behind these changes is the intertwining of urban and rural culture (Petrovik, 2007).

Although the olive groves were repeatedly selected for their economic value during the participatory mapping process, the in-depth interviews revealed a different story; this type of agriculture is not seen as remunerating when compared to using the land for tourism purposes. This finding is in line with the reported deagrarianization which results in livelihood diversification, which is the process by which rural families construct a diverse portfolio of activities and social support capabilities in order to survive and to improve their standards of living (Bryceson, 2002). Livelihood diversification is in fact what is observed in Kfarmatta, a shift from agriculture, specifically olive production, to tourism with the rise of the private estates with swimming pools, and the replacement of agricultural lands by this new business. This

trend of replacing or abandoning agricultural lands is seen throughout Lebanon. For example, a 2002 GIS study shows that there was an overall reduction in agricultural areas varying from 31% for olive groves, 35% for citrus plantations, 72% for fruit tree orchards, and 82% for vineyards (Masri et al., 2002).

The observed abandonment of agricultural lands and the lack of forest management in Kfarmatta is leading to an increase in the number of local fires due to “an augment of biomass undergrowth fuel, the increase in the unbroken forest spans, and the replacement of traditional low productivity agricultural crops by spontaneous vegetation and eventually woods” (Tabara et al, 2003). This phenomenon is also shown by Gellrich et al. (2006), who mention that the decline in agriculture leads to the replacement of agrarian lands by forests through a forest re-growth phenomenon. On the other hand, the absence of any economic value to these recent forests is thought to be the cause leading to the absence of management such as pruning and thinning which in turn exposes the forest to an increasing risk of fire due to the increased presence of biomass undergrowth fuel (Tabara et al, 2003). That was the case in Al-Areed forest of Kfarmatta a few decades ago, before the municipality along with some local and national NGOs started managing the forest. In fact, and after the management process no more fires have occurred in this forest and it became safe. On the other hand, the steep slopes of Al-Mallaha forest located far from the Kfarmatta neighborhood burn frequently as they are inaccessible. Mouillot et al. (2005) indicated that land abandonment in the Mediterranean region may transform these lands into scrublands which are more prone to fire break out.

A framework inspired by the forest fire risk circle of Tabara et al (2003) was developed to explain how “specific social and environmental conditions, which did not

exist in the local rural landscape before that time, were taken into account to understand the reasons for the new forest fire risk situation” (Figure 8).

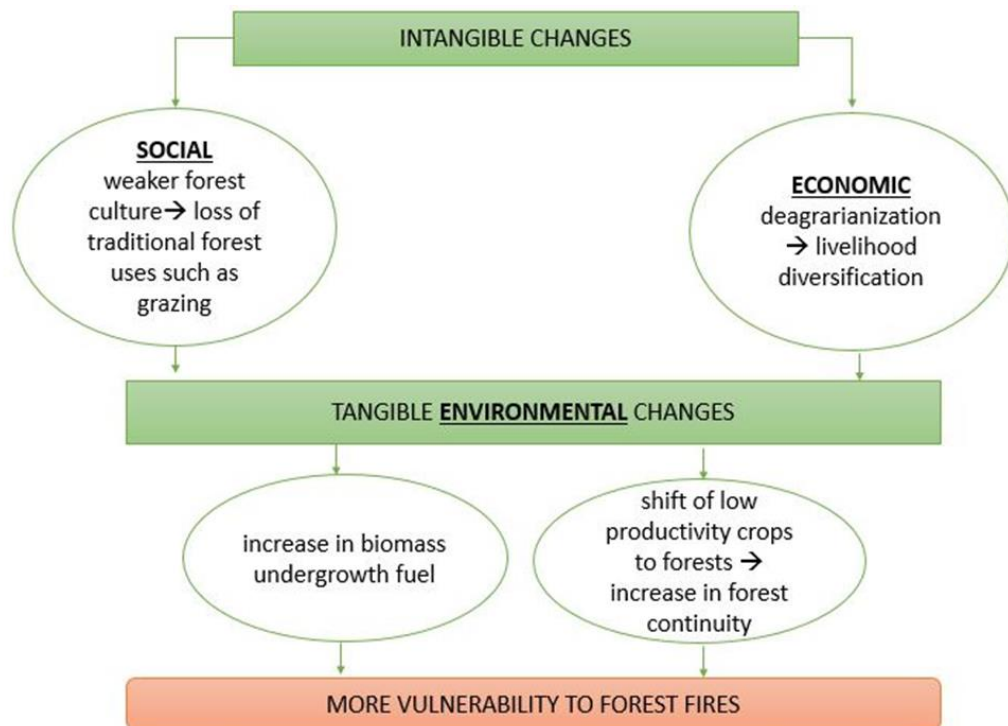


Figure 9 Forest fire vulnerability framework for Kfarmatta case study village (source: author)

Tabara et al (2003) forest fire risk circle framework is divided into t1 (the extent relevant social actors are able to anticipate and prevent such socio-environmental changes in the present dry season) and t2 (the need to maintain local control capacity to contain the potential growth of impacts *before* the next dry season arrives) in order to have a suitable management of forest fire risks. The framework developed in this research takes the main processes of change from Tabara et al (2003), and details them by dividing them into social processes (weaker forest culture and loss of traditional forest uses) and economic processes (deagrarianization and livelihood diversification). These intangible changes which are occurring in rural areas, lead to tangible

environmental changes which in turn contribute to a higher vulnerability to forest fires, such as the increase in biomass undergrowth fuel and an increased forest continuity.

This study shows that the reasons for the new forest fire risk situation are the result of complex processes that when taken into consideration may explain why and how intangible social and economic changes implying a “livelihood shift” happening in rural areas are causing tangible changes in the rural landscape which become more vulnerable to forest fires.

The study also revealed local trends that show how Kfarmatta is addressing the prevailing socio economic situation. There are local efforts to conserve Al-Areed forest as “Hima”, a land protected and conserved by the local community and authority to promote ecotourism. This management plan includes an educational aspect where it is planned to use the forest for students to look for and discover plants. It also includes a recreational aspect with the creation of a play area for kids with the assistance of local youth. In addition, trails will be cleared for hiking which will link Kfarmatta to the neighboring villages, while also acting as fire breaks. These plans are in line with the population demographic of the village where a relatively high percentage of youth still reside in the village. The Hima management plan which is under consideration by the village of Kfarmatta is essential at this point since it promotes the concept of community forestry, which according to Pagdee et al (2006), focuses on improving the livelihood of rural people and conserving natural forests through local participation and cooperation. Community forestry through the Hima management plan will therefore help improve the relationship of locals with the forest and hence strengthen their forest culture.

The livelihood diversification in Kfarmatta where private pools are built within olive groves can revive interest in olive production because displaced olive trees are replanted around the pools and taken care of by farmers to ensure that the facilities remain attractive to tourists. Furthermore, the asphalted roads constructed to reach the private pools within the olive orchards, also had a positive effect on olive production because they are making it easier for farmers to reach their olives groves on one hand, and for firefighters to reach the fires if they ever happen in the groves. These observed modifications are an example of what is known as the development of “new ruralities”, which according to Entrena-Duran (2015), its most prominent characteristics include current trends towards multifunctionality and socio-economic diversification, where tourism represents “a rediscovery” and “a redefinition” of the rural sphere. This type of tourism is a form of “glocalization”, where the global concept of private pools is taken and localized in the middle of aged olive groves.

It is worth mentioning that the Covid19 pandemic encouraged local residents to return to their lands and work in agriculture. In fact, as seen in all the interviews, the residents, and especially the youth, had their relationship with olive production restored during the pandemic lockdown, where they discovered that land is an asset in their village.

CHAPTER V

CONCLUSION

In this research, it is argued that changing bioclimatic conditions are not the only reason behind the occurrence of forest fires; instead, social, economic and environmental changes in the Mediterranean rural landscape are leading to such fires. Intangible socio-economic changes are in fact observed in villages implying a “livelihood shift”. The intangible social dimension is seen through a weaker forest culture and the loss of traditional forest uses, while the intangible economic dimension is seen through the process of deagrarianization that leads to livelihood diversification. These intangible socio-economic changes in rural areas lead to future tangible environmental changes such as the increase in biomass undergrowth fuel and an increased forest continuity which makes these landscapes more vulnerable to forest fires. Therefore, the socio-economic factors should be dealt with in order to reduce this vulnerability, which can be done through working with the concept of “community forestry” and positively working with the process of “new ruralities”. By dealing that way with the socio-economic intangibles changes, the tangible environmental transformations happening in the rural landscape (increase in biomass undergrowth fuel and increased forest continuity) will decrease, resulting in a decreased vulnerability to forest fires.

APPENDIX

INTERVIEW GUIDE:

- What does the forest mean to you? Why is it an important part of the identity of the village?
- How do you use the forest nowadays? How was the relationship of villagers with the forest in the past? How do you see this relationship in the future?
- How can you describe the forest nowadays? In the past? In the future?
- Who is responsible for taking care of the forest? How do you describe his performance at this?
- What are in your opinion the causes of forest fires? What are some solutions? What were the practices that were present in the past that contributed to forest fire reduction that are now not present anymore?
- Are you afraid OF or ON the forests because they catch fire? What do you feel when a forest fire happens in the village? How does it affect your daily lives?
- Tell me about agriculture in the past? What did the villagers used to plant? Where were the products sold? What about in the present? Has it decreased? Why? Is the new generation as interested as the older one in working in the lands? As a result, how do you imagine the agricultural lands in the future? What about livestock farms? Do you think their number has decreased? Why do you think so? Where did the villagers buy their food products such as eggs, meat, and dairy from in the past? Do you think it has changed nowadays with the presence of brands and supermarkets?
- Read the below social values of the ecosystem services and point on the village map the place(s) where each value is perceived:

Aesthetic I value these areas for their scenic qualities

Biological diversity I value these areas because they provide places that support a variety of plants, animals, and other living things

Economic I value these areas because they provide income and employment, through industries like oil and gas, mining, tourism, and forest products

Educational I value these areas because they provide opportunities to learn about the natural environment, through activities like nature interpretation and scientific experiments

Existence I value these areas because they exist for their own sake, even if I or others don't use or benefit from them

Historic or cultural I value these areas because they have features that represent history, or provide places where people can continue to pass down wisdom, traditions, and a way of life

Recreational I value these areas because they provide places for outdoor recreation activities such as hiking, camping, snowmobiling, fishing, and bird watching

Spiritual I value these areas because they are sacred, religious, or spiritually special places

Subsistence I value these areas because they provide forest products that can be freely gathered and hunted for personal consumption, such as mushrooms, berries, herbs, firewood, and animals

Wilderness I value these areas because they are wild, uninhabited, and relatively untouched by human activity

- Additional Question: In your opinion, is there a sense of belonging to the community in the village? What can you tell me about it? Does the massacre

that happened during the war still have drawbacks on reuniting the two communities?

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